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Negative Urgency and Emotion Regulation Predict Positive Smoking Expectancies in Non-Smoking Youth

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Abstract

Introduction—The purpose of the study was to better understand early risk for positive smoking expectancies, which have been shown to be a consistent predictor of smoking initiation among youth. Two affect-based risk factors—negative urgency and emotion dysregulation—associated with smoking behaviors among youth, were examined for unique and interactive effects on positive smoking expectancies among substance-naïve youth.

Methods—Participants were 61 10–14-year-old children with virtually no drug use (less than 5 substance use incidents across the lifetime), who were drawn from the community.

Results—Both negative urgency and emotion dysregulation were significantly associated with positive social facilitation smoking expectancies. Further, negative urgency was significantly related to positive social facilitation smoking expectancies at higher levels of emotion dysregulation ($b = .09, p = .001$).

Conclusion—The findings provide evidence that both emotion dysregulation and negative urgency are positively associated with positive social-related smoking expectancies among a sample of 10–14-year-olds. Children who are emotionally dysregulated *and* who act rashly in response to negative emotions appear more likely to endorse beliefs regarding the socially enhancing effects of smoking, suggesting that these youth may be at high risk for smoking initiation.

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Contributors

The authors have worked in collaboration for this study. LH and AD designed the study and LH collected the data. AD and DB conducted the data analysis and wrote the initial draft of the manuscript. EM contributed to the literature review and data collection, analysis, and interpretation. TZ contributed substantially to interpretation of the data and critically revised subsequent drafts of the manuscript. All authors contributed to and approved the final manuscript.

Conflict of Interest

The authors have no conflicts of interest to disclose.

Keywords

Smoking expectancies; Impulsivity; Emotion regulation; Youth smoking behavior

1. Introduction

Nicotine dependence is one of the most common forms of chemical dependence in the United States with typical addiction onset occurring prior to age 18 (American Society of Addiction Medicine, 2008; U.S. Department of Health and Human Services [USDHHS], 2012). Although rates of tobacco use among youth have decreased over the years (Substance Abuse and Mental Health Services Administration, 2013), close to one-fourth of high school students are current tobacco users (Centers for Disease Control and Prevention, 2013). This is of concern given estimates that, among smokers under age 18, more than 6 million may die prematurely from a smoking related disease (National Institute on Drug Abuse, 2012), such as cardiovascular disease or lung cancer (Hegmann et al., 1993; Huxley et al., 2012; USDHHS, 2004).

There is a critical period in childhood during which children establish beliefs about the reinforcing and punishing effects of substances (i.e., outcome expectancies; Miller, Smith, & Goldman, 1990). One form of such beliefs are positive smoking expectancies, defined as learned beliefs about the potential positive effects or outcomes that result from smoking cigarettes (e.g., Brandon & Baker, 1991). Among youth, positive expectancies have been endorsed by substance-naïve children as young as seven years old (Copeland et al., 2007) and predict smoking onset (Copeland et al., 2007; Doran et al., 2013). For example, positive expectancies held by 5th-grade non-smokers predicted smoking behavior six months later (Guller, Zapolski, & Smith, 2014). Expectations that smoking reduces negative affect and enhances social interactions have also been shown to differentiate smokers from non-smokers in elementary school (Combs, Spillane, Caudill, Stark, & Smith, 2011), and are associated with smoking behavior and nicotine dependence among adolescents (Bauman & Chenoweth, 1984; Heinz, Kassel, Berbaum & Mermelstein, 2010). These findings highlighting the relationship between early-formed smoking expectancies and smoking outcomes suggest that preventative efforts be made to understand factors related to smoking expectancies prior to youth's first smoking experience.

Two factors worth investigating in relation to positive smoking expectancies are impulsivity and emotion regulation, as both are associated with cigarette smoking (Bickel, Odum, & Madden, 1999; Morrell, Cohen, & McCharge, 2010). While impulsivity as a broad construct is associated with adolescent smoking (Burt, Dinh, Peterson, & Sarason, 2000; Mâsse & Tremblay, 1997), negative urgency—the tendency to act rashly in response to negative emotions (Cyders & Smith, 2008; Whiteside & Lynam, 2001)—is one of the most consistent impulsivity-related predictors of smoking behaviors and has been linked to smoking initiation, experimentation (Combs et al., 2011; Doran et al., 2013; Settles et al., 2012), and problematic substance use in adolescents (Settles, Cyders, & Smith, 2010; Stautz & Cooper, 2013). Emotion regulation—a multidimensional construct comprised of mechanisms responsible for monitoring, recognizing, and modifying emotional states (Aldao & Nolen-

Hoeksema, 2010; Barkley & Fischer, 2010; Thompson, 1994)—also predicts adolescent smoking behaviors (Novak & Clayton, 2001; Weinstein, Mermelstein, Shiffman, & Flay, 2008; Wills, Walker, Mendoza, & Ainette, 2006), addiction onset, and treatment outcomes in youth and adults (see Cheetham, Allen, Yücel, & Lubman, 2010 for review). Specifically, those with higher levels of emotion dysregulation (more difficulty in regulating emotions) have been shown to be at higher risk for smoking (Cheetham et al., 2010). There is evidence for overlap in emotion regulation and impulsivity-related traits such as negative urgency (Eder, 2011; Settles et al., 2012) given that emotional inhibitory control is one component of emotion regulation (Barkley & Fischer, 2010; Mitchell, Robertson, Anastopolous, Nelson-Gray, & Kollins, 2012). However, other evidence recognizes negative urgency as distinct from other emotion-related constructs (e.g., Cyders & Coskunpinar, 2010; Schreiber, Grant, & Odlaug, 2012) with each playing independent roles in smoking outcomes (e.g., Bickel, Odum, & Madden, 1999; Morrell et al., 2010). To date, limited research has been conducted examining the unique roles of each when both are included in the same risk model; research examining the mechanisms through which these traits may interact with one another and influence risk for substance use is also lacking.

The theoretical model often used to understand these risk pathways is the Acquired Preparedness Model of risk for substance use (AP Model; Smith & Anderson, 2001), which posits that dispositional impulsivity shapes the learning process by differentially predisposing individuals to acquire positive expectancies for substances, which then increase risk for engaging in substance use (McCarthy, Kroll, & Smith, 2001). According to this model, people with trait impulsivity are more likely to form positive expectancies for substance use behavior due to a learning bias towards the reinforcing rather than punishing consequences of behavior (Smith & Anderson, 2001). As applied to smoking then, the AP Model suggests that individuals with high impulsivity are more likely to learn from a given event that smoking will bring about reinforcing consequences, and thus, develop stronger beliefs that smoking cigarettes will reduce negative affect or enhance social experiences, resulting in an increased likelihood of smoking (e.g., Brandon & Baker; Combs et al., 2011). For example, a recent longitudinal study found that negative urgency led to the development of positive smoking expectancies, which predicted later initiation of smoking behavior among substance-naïve elementary school children (Combs et al., 2011). To date, no study has directly examined whether emotion dysregulation is related to smoking expectancies among non-smoking youth; however, given theoretical (Cyders & Smith, 2008) and predictive similarities in these affect-based risk factors (e.g., Cougle, Timpano, & Goetz, 2012; Weiss, Tull, Anestis, & Gratz, 2013), and the association between emotion regulation and smoking behavior, we propose that the AP model for smoking expectancies applies to emotion dysregulation as it has to negative urgency.

The current study will be the first to examine the influence of both negative urgency and emotion dysregulation on positive smoking expectancies related to negative affect reduction and social facilitation among youth who have not yet begun smoking. Specifically, we hypothesize that (1) consistent with previous findings, those with higher levels of negative urgency will be more likely to endorse positive smoking expectancies; (2) given theoretical and predictive similarities to negative urgency, emotion dysregulation will provide incremental predictability in the endorsement of positive smoking expectancies; and (3)

there will be an interaction between negative urgency and emotion dysregulation, such that high levels of both traits will yield the strongest association with positive smoking expectancies. To best test these hypotheses, we have enriched a sample of typically developing youth both with and without externalizing disorders and family histories of a substance use disorder (SUD) in order to obtain a range of negative urgency and emotion dysregulation scores across the study sample. Findings from this study expand on previous literature by examining the unique and interactive influences of negative urgency and emotion regulation on positive smoking expectancies prior to smoking initiation. Such findings may enhance prevention programming to decrease risk for smoking initiation among children.

2. Methods

2.1 Participants and Procedure

Participants were 61 English-speaking children aged 10–14 (see Table 1 for demographics) with at least one parent capable of reading and speaking English. Parents of participants were recruited using community advertisements as well as contact with schools and pediatric offices in a Midwest metropolitan area (see Hulvershorn et al., 2013 for more detailed recruitment methods for the primary neuroimaging study for which they were recruited). We recruited only youth who denied prior substance use or who reported fewer than five lifetime substance use incidents, but who were at varying risk levels for the development of a SUD (based on psychological factors and family history) to obtain a diverse range of smoking expectancy scores. Participants defined as *high-risk* were biological offspring of men with past or present SUDs and met DSM-IV criteria for attention-deficit/hyperactivity disorder combined type, plus a disruptive behavior disorder (defined as conduct disorder, oppositional defiant disorder, or disruptive behavior disorder, not otherwise specified; $n = 32$). Participants defined as *low-risk* had no first-degree relative with SUD history and no current or lifetime history of the aforementioned DSM-IV diagnoses ($n = 29$).

Only participants with fewer than five lifetime uses of any drug of abuse were included. Lifetime substance use was determined based on child self-report as well as urine toxicology screening (Uritox Medical) testing for five illicit drugs (methamphetamine, ecstasy, cocaine, opiates, and cannabis) and cotinine. Based on self-report, $n = 3$ high-risk participants reported any lifetime use. Based on urine screening, no participants tested positive for any illicit drugs, and $n = 6$ participants ($n = 1$ low-risk, $n = 5$ high-risk) had cotinine levels that were assumed to be the result of second-hand smoke exposure, given parental endorsement of nicotine use in the home. The following were also used as exclusionary criteria: in utero exposure to drugs or alcohol (per caregiver report), psychotic symptoms, pervasive developmental disorders, current depression or mania, history of neurological problems, Full-Scale IQ below 75, and debilitating medical conditions (see Hulvershorn et al., 2013 for full description of study recruitment and participation selection procedures).

Written consent/assent was obtained from at least one parent and the child utilizing university IRB-approved materials. The substance use domain of the Drug Use Screening Inventory (DUSI-R; Tarter, 1990) was administered to each child privately as well as a rapid

urine toxicology screening (Uritox Medical). A trained doctoral-level clinician completed the K-SADS-PL (Kaufman et al., 1997) semi-structured interview separately with parent and child to determine present or lifetime psychiatric diagnoses, as well as any history of substance use. The Structured Clinical Interview for DSM-IV/Non Patient Edition (First, Spitzer, Gibbon, & Williams, 2002) was given to either the child's father or an informant to determine paternal SUDs. Children and parents also completed self- and parent-report measures assessing the child's impulsivity and emotion regulation, respectively.

2.2 Measures

2.2.1 Negative urgency—*The UPPS-P Impulsive Behavior Scale modified for children* (UPPS-PC; Zapolski, Stairs, Settles, Combs, & Smith, 2010) was completed by each child participant. The negative urgency subscale of the UPPS-PC is an 8-item self-report with response ranges from 1 (*agree strongly*) to 4 (*disagree strongly*) and higher scores indicating more impulsive tendencies ($\alpha = .92$).

2.2.2 Emotion dysregulation—*The Emotion Regulation Checklist* (Shields & Cicchetti, 1997) is a 24-item parent report scale assessing the child's emotional self-awareness, emotional expression, and lability. The Emotion Regulation subscale was used for analyses in the current study. Scores were reverse-coded so that higher scores indicate higher levels of emotion dysregulation ($\alpha = .78$).

2.2.3 Positive smoking expectancies—*The Positive Reinforcement Scale of the Adolescent Smoking Consequences Questionnaire* (Lewis-Esquerre, Rodrigue, & Kahler, 2005) was used to measure participants' positive beliefs about smoking, and two separate subscales were created: (1) negative affect reduction expectancies (e.g., "Smoking helps an angry person calm down") assessed beliefs about the role of smoking in reducing negative affect ($n = 7$ items; $\alpha = .91$), and (2) social facilitation expectancies (e.g., "Smoking makes a person feel more comfortable around others") assessed beliefs related to the socially enhancing effects of smoking ($n = 7$ items; $\alpha = .83$). Responses ranged from 1 (*never*) to 5 (*always*) with higher scores indicating stronger positive beliefs about smoking.

2.3 Statistical analyses

All analyses were done using SPSS 20.0. Bivariate correlations were conducted to examine relationships between emotion dysregulation, negative urgency, negative affect reduction smoking expectancies, and social facilitation smoking expectancies. A hierarchical multiple regression analysis was performed to predict positive smoking expectancies. The predictors were entered as follows: age, gender, risk group (Step 1), negative urgency (Step 2), emotion dysregulation (Step 3) and the interaction of negative urgency and emotion dysregulation (Step 4). The PROCESS macro (Hayes, 2013) was used to probe the interaction (simple moderation: the conditional effect model specified as Model 1 by Preacher, Rucker, & Hayes, 2007) using the Johnson-Neyman technique (Johnson & Fay, 1950; Johnson & Neyman, 1936), which determines at what value of the moderator the effect of the independent variable on the dependent variable becomes non-significant (Hayes, 2012). For this analysis, positive social enhancement smoking expectancies was the dependent variable, negative urgency was the independent variable, and emotion

dysregulation was the moderator; age, gender and risk group were included as covariates. Emotion dysregulation, negative urgency, and the interaction term were also mean-centered prior to moderation analysis.

3. Results

Preliminary analyses indicated that negative urgency and emotion dysregulation were significantly, moderately correlated ($r = 0.37, p = .004$). Also, social facilitation expectancies were significantly related to both negative urgency ($r = .36, p < .01$) and emotion dysregulation ($r = .30, p = .02$), while negative affect reduction smoking expectancies were only significantly related to emotion dysregulation ($r = .38, p < .01$; negative urgency $r = .20, p = .11$); thus, hierarchical regression analyses were only done using social enhancement smoking expectancies as the dependent variable. Additionally, although high-risk youth showed higher levels of negative urgency and emotion dysregulation than low-risk youth, there were only significant group differences in levels of positive social facilitation expectancies – not affect reduction expectancies – such that the high-risk group had significantly higher levels of social enhancement expectancies compared to the low-risk group ($t = 2.64, p = .01$; see Table 1 for full results). Consistent with our first hypothesis, negative urgency was significantly and independently associated with positive social enhancement smoking expectancies, even when controlling for group status, gender, and age ($b = .26, p = .01, sr^2 = .06$). However, when emotion dysregulation was added to the model, both emotion dysregulation and negative urgency were only associated with social enhancement smoking expectancies at a trend level of significance ($b = .32, p = .06, sr^2 = .05$ and $b = .21, p = .06, sr^2 = .05$), suggesting that traits account for only minimal unique variance (see Table 2). Still, consistent with our third hypothesis, there was a significant interaction between negative urgency and emotion dysregulation ($b = .09, p = .001, R^2 \text{ change} = .15$), such that negative urgency was significantly related to positive social enhancement smoking expectancies only from mean to high levels (one standard deviation above the mean) of emotion dysregulation ($b = .26, t = 2.58, p = .01$ and $b = .63, t = 4.10, p < .01$, respectively). See Table 2 for full regression output and Figure 1 for moderation results. Results suggest that children who are both emotionally dysregulated and more impulsive in response to negative emotions are more likely to endorse positive social enhancement smoking expectancies.

4. Discussion

Given the strong association between smoking expectancies and smoking initiation among adolescents, the current study examined two potential risk factors—negative urgency and emotion dysregulation—for the development of positive smoking expectancies among (largely) substance-naïve youth. Consistent with previous research (Combs et al., 2011), our findings demonstrated that negative urgency and emotion dysregulation were both uniquely related to positive social facilitation smoking expectancies, although the unique variance was minimal. Our novel finding was that youth who were emotionally dysregulated *and* who acted rashly in response to negative emotions were most likely to endorse positive social facilitation smoking expectancies, and thus, may be at greater risk for smoking initiation.

These findings implicate negative urgency, and the particular combination of high negative urgency and emotion dysregulation, as important dispositional risk factors of smoking behavior through expectancies, as outlined by the AP Model (i.e., traits predispose individuals to develop positive expectancies for substances). Specifically, the AP Model applied to these findings suggests that high negative urgency with high emotion dysregulation may predispose smoking-naïve youth to develop positive expectancies about the socially-enhancing effects of smoking, which, evidence suggests, later leads to smoking onset (e.g., Combs et al., 2011). This possibility is consistent with the finding that even before initiation of smoking, personality traits differentiate children who endorse expectancies about positive outcomes of smoking from those who do not (Copeland et al., 2007).

Interestingly, negative urgency and emotion dysregulation were only significantly related to beliefs regarding the socially enhancing effects of smoking, and not related to beliefs regarding the negative affect-reducing effects of cigarettes. Still, these results are consistent with previous research evincing the relationship between negative urgency and affect-based traits and positive social-related expectancies, and in turn subsequent cigarette use (e.g., Combs et al., 2011).

One explanation for these findings could be that since early adolescence is a developmental period when social interactions and relationships become more important (e.g., Smetana, Campione-Barr, & Metzger, 2006; Steinberg, 2008), beliefs regarding the socially-enhancing effects of smoking (and other substances) are more salient (e.g., Gunn & Smith, 2010; Settles, Zapski, & Smith, 2014). Further, emotionality and emotion regulation are associated with social functioning and social consequences (Eisenberg, Fabes, Guthrie, & Reiser, 2000; Gross, 2002). For example, lower distress levels typically contribute to more positive social outcomes; therefore, these youth who are more likely to act rashly in response to negative emotional states *and* who are also more emotionally dysregulated may be more likely to learn that smoking ultimately increases positive social experiences (Gunn & Smith, 2010). Such socially impaired youth may be in greater need for “remedies” to address their interpersonal shortcomings. This need could potentially then lead to the onset of smoking or other substance use, as has been suggested (e.g., Combs et al., 2011; Gunn & Smith, 2010).

Our findings support the need for indicated smoking prevention strategies for youth who exhibit high negative urgency and emotion dysregulation. To date, limited research has examined strategies to prevent smoking initiation among youth, particularly among those who are more impulsive and emotionally dysregulated. One possible strategy is a mindfulness-based approach, which has been effective in reducing emotion dysregulation and other high-risk, affect-based traits in clinical and non-clinical youth populations (Broderick & Jennings, 2012; Witkiewitz & Bowen, 2010; Zoogman, Goldberg, Hoyt, & Miller, 2014), though it has not been specifically examined as a preventative tool for smoking initiation. Another potential strategy is to prevent the formation of positive smoking expectancies using expectancy challenge techniques, which have been successful in interventions for substance users (Darkes & Goldman, 1998; Scott-Sheldon, Terry, Carey, Garey, & Carey, 2012) and drug-naïve youth (Cruz & Dunn, 2003). This could be

particularly important considering the importance of positive social facilitation expectancies in the current study. A recent alcohol expectancy intervention for elementary school nondrinkers found an increase in negative alcohol expectancies following the intervention (Cruz & Dunn, 2003). As negative outcome expectancies are associated with lower use, this could be an effective strategy if applied to smoking prevention among youth.

While this study provided initial evidence that the relationship between emotion dysregulation and negative urgency play an important role in smoking expectancies prior to smoking initiation in youth, some limitations warrant note. Though the AP model suggests that negative urgency and emotion dysregulation predict positive social-related smoking expectancies, these results are cross-sectional, so we cannot infer causality. Furthermore, smoking initiation was not tested, so we cannot confirm whether negative urgency and emotion dysregulation actually predict smoking initiation. Future research will prospectively examine the combined effects of negative urgency and emotion regulation on the development of smoking expectancies and smoking initiation in youth. Additionally, emotion regulation includes both positive and negative emotionality, and the current study focused on negative emotion-based rash action; however, evidence suggests an important role of positive emotion-based rash action in substance use also (e.g., Audrain-McGovern, Rodriguez, & Leventhal, 2015; Guller, Zapolski, & Smith, 2015). Thus, future research should examine the role of positive urgency and emotion regulation in the development of smoking expectancies and later initiation. Limitations of the sample include its size, which prevented us from examining race or gender differences, and the specialized nature of the high-risk group, who were at heightened risk for developing a SUD (based on psychological risk factors and family history). These results may not generalize to non-clinical or exclusively low-risk populations. Additionally, while $n = 6$ participants showed urine cotinine levels consistent with exposure to second-hand smoke, we did not assess or control for participants' secondhand or social smoke exposure, which may influence smoking expectancies and smoking initiation (Racicot, McGrath, & O'Loughlin, 2011). Lastly, this study relied on self- and parent-report; although there is strong evidence for the validity of the measures used, interview assessments for our primary outcome variables may have provided more precise information.

Despite these limitations, this study is the first to examine and support the unique effect of emotion regulation and its interaction with negative urgency on smoking expectancies among youth without substance use disorders. Our findings indicate that youth who are both emotionally dysregulated and more impulsive in response to negative emotions are more likely to endorse positive smoking expectancies, and may be at greater risk for subsequent smoking initiation. Thus, future prevention efforts aimed at reducing smoking onset among youth may include targeted programming for those with higher negative urgency and emotion dysregulation, as well as focusing programming on challenging beliefs related to socially-enhancing effects of smoking and other substances.

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Highlights

- Positive smoking expectancies were explored among substance-naïve children.
- Negative urgency and emotion dysregulation were uniquely related to expectancies.
- Emotion dysregulation moderated the effect of negative urgency on expectancies.
- Youth high on both traits may be at higher risk for smoking initiation.

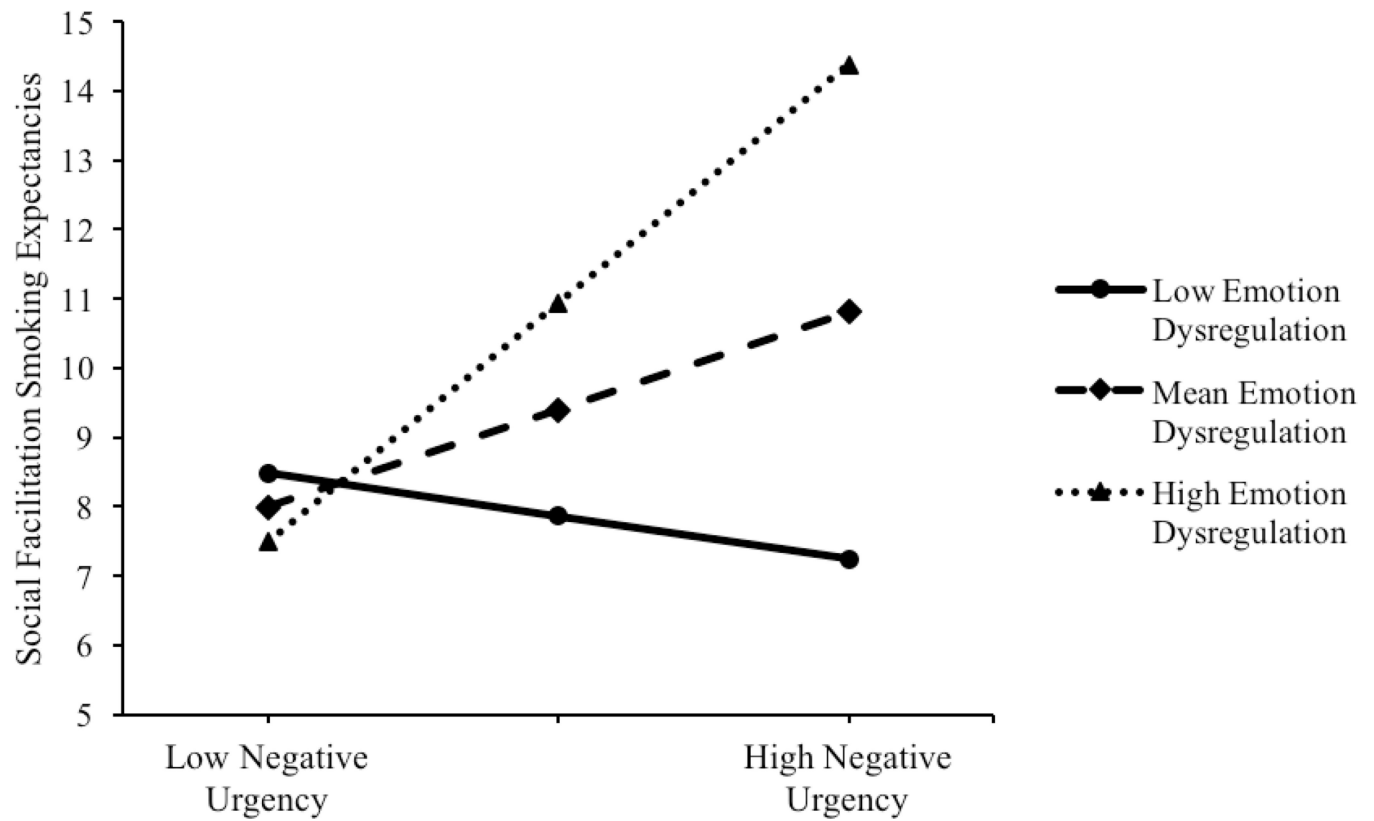


Figure 1. Negative urgency and emotion dysregulation interact such that negative urgency is only related to positive smoking expectancies at mean and high levels of emotion dysregulation.

Table 1

Sample demographics and variable means and comparison of high-risk and low-risk groups.

Variable	Mean or N (SD or %)			<i>t</i> -test difference
	Total	High risk	Low risk	
Age	12.03 (1.28)	12.19 (1.33)	11.86 (1.22)	.99
Gender				
Male	38 (62.3)	22 (68.8)	16 (55.2)	
Female	23 (37.7)	10 (31.3)	13 (44.8)	
Race				
African American	26 (42.6)	17 (53.1)	9 (31.0)	
Caucasian	25 (41.0)	11 (34.4)	14 (48.3)	
Biracial	8 (13.1)	4 (12.5)	4 (13.8)	
Asian / Pacific Islander	2 (3.3)	0	2 (6.9)	
Negative Urgency	17.54 (5.44)	19.97 (4.57)	14.86 (5.10)	4.12*
Emotion Dysregulation	14.30 (4.08)	16.88 (3.28)	11.45 (2.77)	6.94*
Positive Smoking Expectancies				
Negative Affect Reduction	13.20 (6.49)	14.28 (7.16)	12.0 (5.54)	1.38
Social Facilitation	10.13 (4.36)	11.47 (5.40)	8.66 (2.02)	2.64*

*Note.**
 $p < .05$. $N = 61$. High risk $n = 32$. Low risk $n = 29$.

Table 2
Results of hierarchical multiple regression analysis predicting positive social facilitation smoking expectancies

Variable	<i>b</i>	<i>SE</i>	<i>sr</i> ²	<i>R</i> ²	<i>F</i>	<i>R</i> ² change	<i>F</i> change
Step 1				.07	2.60		
Age	-.04	.43	.00				
Gender	-1.09	1.12	.01				
Group	2.68**	1.09	.10				
Step 2				.12	3.08*	.06	4.09*
Age	-.05	.42	.00				
Gender	-.69	1.11	.01				
Group	1.58	1.20	.03				
Negative Urgency	.23**	.11	.06				
Step 3				.16	3.26**	.05	3.45
Age	-.15	.41	.00				
Gender	-1.01	1.10	.01				
Group	-.09	1.47	.00				
Negative Urgency	.21*	.11	.05				
Emotion Dysregulation	.32*	.17	.05				
Step 4				.31	5.50**	.15	13.11**
Age	-.31	.38	.01				
Gender	-1.42	1.00	.02				
Group	-.67	1.34	.00				
Negative Urgency	.26**	.10	.08				
Emotion Dysregulation	.38**	.16	.07				
Negative Urgency × Emotion Dysregulation	.09***	.03	.15				

Note.

*
 $p < .10$

**
 $p < .05$.

 $p < .01$.

Negative urgency and emotion dysregulation were mean-centered prior to analyses.

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